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1-GP-133a
16 June 1961
CANCELLATION
6 July 1962

CANADIAN GOVERNMENT SPECIFICATIONS BOARD

Specification
for

ENAMEL; ALKYD, GLOSS, FOR AIRCRAFT

CGSB 1-GP-133a, dated 16 June 1961, is cancelled as of 6 July 1962 and is superseded by CGSB 1-GP-88b, Enamel; Alkyd, Air Drying and Baking, Gloss, issued 16 June 1961.



NADA

CANADIAN GOVERNMENT SPECIFICATIONS BOARD

SPECIFICATION

FOR

ENAMEL; ALKYD, GLOSS, FOR AIRCRAFT

1-GP-133a

16 JUNE 1961

THIS SPECIFICATION APPLIES TO AIR-DRYING ALKYD GLOSS ENAMEL FOR
USE ON PRIMED INTERIOR AND EXTERIOR AIRCRAFT SURFACES.

NATIONAL RESEARCH COUNCIL, OTTAWA, CANADA

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1-GP-133a
16 June 1961
Supersedes 1-GP-133
1 November 1957

CANADIAN GOVERNMENT SPECIFICATIONS BOARD

Specification
for

ENAMEL; ALKYD, GLOSS, FOR AIRCRAFT

1. DEFINITION

1.1 This specification applies to air-drying alkyd gloss enamel for use on primed interior and exterior aircraft surfaces.

1.2 For more detailed information on uses see 8.1.

2. APPLICABLE PUBLICATIONS

The following publications are applicable to this specification:

2.1 CGSB 1-GP-12, Standard Paint Colors.

2.2 CGSB 1-GP-71, Methods of Testing Paints and Pigments.

2.3 ASTM Standards on Paint, Varnish, Lacquer and Related Products (and latest supplement).

2.4 Reference to the above publications and other specifications is to the issues in effect on the date of invitation to tender, unless otherwise specified.

3. CLASSIFICATION

3.1 The enamel shall be supplied in one type.

4. GENERAL REQUIREMENTS

4.1 The enamel shall consist of suitable pigments adequately milled in a vehicle composed of a medium-length oil-modified alkyd resin together with the necessary thinners and driers.

4.2 The enamel as supplied shall be suitable for brushing, and shall be satisfactory for spraying when reduced with 1-GP-70 thinner in accordance with the manufacturer's instructions.

4.3 When applied, the enamel shall produce a film of uniform gloss and appearance, free from streaks, bubbles, haze, mottling, wrinkling, floating or coarse particles.

4.4 The enamel shall not skin, thicken excessively or cake in the original unopened containers for one year from date of shipment when stored at a temperature not exceeding 100°F (38°C). At the end of this time it shall be readily mixed to a uniform condition by simple stirring and shall meet the requirements for drying time.

4.5 Qualification - When requested by the purchaser, the enamel shall be a product qualified by the specified procedure, and such qualification shall be a prerequisite for tendering (see 8.3).

5. DETAIL REQUIREMENTS

Enamel to this specification shall comply with the following detail requirements:

		Test Method			
		Min	Max	1-GP-71	ASTM
5.1	Flash Point, Pensky-Martens °F	85	-	3.1	-
	°C	30	-	3.1	-
5.2	Viscosity, Krebs units	65	85	4.5	-
5.3	Drying Time, hours				
5.3.1	Dry-to-touch	-	1.5	5.1	-
5.3.2	Dry-hard	-	8	5.1	-
5.4	Gloss, units	87	-	13.1	-
*5.5	Coarse Particles Retained on 44-micron (325 mesh)** sieve, %	-	0.1	-	D185
5.6	Fineness of Grind, Hegman	7	-	-	D1210
5.7	Water Content, % by wt	-	0.5	24.1	-
5.8	Phthalic Anhydride, % by wt of nonvolatile vehicle	30	37	57.1	-
5.9	Rosin and Rosin Derivatives	-	NIL	60.1	-
5.10	Oil Acids, % by wt of nonvolatile vehicle	43	55	63.2	-
5.11	Phenolic Resins	-	NIL	Par. 7.4	

5.12 Skinning Properties - The enamel shall be nonskinning.

Method 10.1

5.13 Color - The enamel shall conform to such of the 1-GP-12 gloss colors listed below, and such other colors, as specified by the purchaser:

Grey 1-7	Blue 2-6	Yellow 5-2
1-8	Green 3-5	Red 9-2
1-9	3-12	Black 10-1
1-13		White 10-2

5.14 Hiding Power - The enamel shall meet the contrast ratio requirements of Table I when applied to black-and-white carrara glass in accordance with the specified method.

* This requirement to be checked at the discretion of the testing authority.

** See CGSB 8-GP-1, Sieves; Testing, Woven Wire.

Table I

Color Number ϕ	<u>Contrast Ratio</u>	
	Dry Film Thickness in., max	Contrast Ratio min
Grey 1-7	.001	0.99
1-8	.001	0.99
1-9	.001	0.99
1-13	.001	0.99
Blue 2-6	.001	0.98
Green 3-5	.001	0.98
3-12	.001	0.99
Yellow 5-2	.001	.88
Red 9-2	.0015	.87
Black 10-1	.001	1.00
White 10-2	.001	.96

Method 128.1

Method 14.7

5.15 Composition of Enamel - The pigment content, vehicle solids and volatile content of the enamel shall be as listed in Table II.

Table II

Enamel Composition - Per cent by Weight

Color Number ϕ	Pigment Content	Vehicle Solids	Volatile Content
	min	min	max
Grey 1-7	15.5	34.5	50
1-8	13	37	50
1-9	13	37	50
1-13	15.5	34.5	50
Blue 2-6	13	37	50
Green 3-5	13	37	50
3-12	10	40	50
Yellow 5-2	27	33	40
Red 9-2	10	35	55
Black 10-1	3	39	58
White 10-2	22	33	45
Method	21.1	19.1	17.1

5.16 Accelerated Storage Stability - The enamel shall withstand heating in a full container for 96 hours at 140°F (60°C) without caking, gelling, thickening, curdling or seeding, and the change in viscosity shall be not more than 5 Krebs units. A film prepared from the enamel so conditioned shall be uniform in appearance, free from streaking, mottling or seeding, and the change in gloss shall not exceed 5 units. At the discretion of the testing authority the heated enamel shall be tested for compliance with other requirements of the specification.

Method 30.3

ϕ For other colors, the purchaser shall specify Contrast Ratio and Enamel Composition.

5.17 Dilution Stability - The enamel shall remain homogeneous and free from precipitation, curdling or thickening when reduced with I-GP-70 thinner in the ratio of 2 volumes enamel to 1 volume thinner.

Method 45.1

5.18 Gasoline Resistance - Panels primed with I-GP-132 zinc chromate primer and topcoated with the enamel shall withstand immersion for 4 hours in Type III 3-GP-951 hydrocarbon fluid at $73 \pm 3.5^{\circ}\text{F}$ ($23 \pm 2^{\circ}\text{C}$) without blistering, lifting, wrinkling, loosening or peeling. After a 24-hour recovery period there shall be no evidence of softening and the gloss shall be not less than 85 per cent of the original gloss. When subjected to the knife test, the ribbon produced shall be free from crumbling and evidence of intercoat separation. There shall be no flaking, loosening nor separation of coats in the area adjacent to the scratch.

Methods 107.5 and 135.1

5.19 Water Resistance - Panels primed with I-GP-132 zinc chromate primer and topcoated with the enamel shall withstand 24-hour immersion in water at $73 \pm 3.5^{\circ}\text{F}$ ($23 \pm 2^{\circ}\text{C}$) without wrinkling, blistering, lifting, loosening or peeling. After a 2-hour recovery period there shall be no evidence of softening, discoloration nor dulling and the gloss shall be not less than 90 per cent of the original gloss. When subjected to the knife test, the ribbon produced shall be free from crumbling and evidence of intercoat separation. There shall be no flaking, loosening nor separation of coats in the area adjacent to the scratch.

Methods 110.10 and 135.1

5.20 Baking Resistance - An enamel film heated 2 hours at $220 \pm 4^{\circ}\text{F}$ ($105 \pm 2.5^{\circ}\text{C}$) and cooled 24 hours under standard conditions (Method 103.1) shall be hard, tough and smooth, and shall show no indication of checking, cracking, flaking, wrinkling nor blistering, and not more than slight discoloration.

Method 112.4

5.21 Flexibility - The dried enamel shall show no cracking nor peeling when subjected to the bending test at 73°F (23°C) using 1/8-inch mandrel.

Method 119.15

5.22 Accelerated Weathering Resistance - The enamel film allowed to dry 7 days shall withstand an exposure period of twenty 24-hour cycles in an accelerated weathering machine without showing evidence of blistering, chalking, checking, cracking, flaking, peeling or appreciable color change. The final gloss shall be not less than 60. Some darkening of enamel color Yellow 5-2 may be permitted.

Method 122.10

5.23 Behavior Toward Undercoats and Self-Lifting - Two coats of enamel, with intervals of 2, 6 and 18 hours between coats, applied over I-GP-132 zinc chromate primer shall show no lifting of either the primer or the first coat of enamel.

Method 133.1

5.24 Adhesion - Panels primed with I-GP-132 zinc chromate primer and topcoated with the enamel, and subjected to the knife test, shall produce a ribbon free from crumbling and evidence of intercoat separation. There shall be no flaking, loosening nor separation of coats in the area adjacent to the scratch. When subjected to the tape test, there shall be no separation of topcoats from the primer nor of primer from the metal.

Methods 135.1 and 137.4

5.25 Outdoor Exposure - When exposed one year in Florida, one coat of enamel applied to steel primed with 1-GP-81 primer shall show no appreciable film deterioration or color change and shall show no more than moderate chalking. The weathered film shall readily polish to a full gloss and reflect a clean sharp image. There shall be no cracking or other impairment of film integrity and the polished area shall be restored to substantially the original color, except that Orange 8-1 and 8-2 and Yellow 5-1 and 5-2 may show some darkening.

Method Par. 7.5

5.26 Application Properties - When sprayed on a large aluminum surface, previously covered with 1-GP-132 primer, to give a coat having a wet film thickness of 3.0 mils the enamel shall show no sagging, and on drying under standard conditions, shall produce a film of uniform appearance, of good flow-out, and free from defects.

6. PREPARATION FOR DELIVERY

6.1 Unless otherwise specified commercial packaging, packing and marking shall be acceptable.

6.2 Labelling - In addition to the labelling requirements of any relevant Acts or Regulations, each container shall be suitably labelled to show the following information together with any markings required by the purchaser:

Manufacturer's Name and Address
Name of Material
CGSB Specification No.
Qualification No. (when required)
1-GP-12 Color
Manufacturer's Batch No.
Manufacturer's Code No.
Date of Manufacture
Thinning Instructions for spraying using 1-GP-70 thinner

7. INSPECTION

7.1 Sampling - Sampling shall be carried out in accordance with Method 1.1 of CGSB 1-GP-71.

7.2 Testing - Unless otherwise specified, the methods of testing shall be those in CGSB 1-GP-71 or in ASTM Standards on Paint, Varnish, Lacquer and Related Products, using the method specified with each requirement.

7.3 Classification of Tests - Tests for determining compliance with this specification shall be classified as follows:

7.3.1 Qualification Tests - Those tests that are performed on samples submitted for qualification as a satisfactory product. They shall consist of all the tests in this specification.

7.3.2 Lot Acceptance Tests - Those tests used to determine the acceptability of a lot or batch of a qualified product. The testing authority may test the material for compliance with any of the requirements of this specification except outdoor exposure (5.25), and may reject a lot or batch on the basis of any requirement in this specification.

7.4 Phenolic Resins

7.4.1 Description - A portion of the separated nonvolatile matter in the case of pigmented coatings, or a portion of the nonvolatile matter in the case of clear coatings, is used for the test. The test is best interpreted by including a known sample of the proper type of resin for comparison.

7.4.2 Procedure - A portion of the nonvolatile matter (0.3 to 0.5 g) is placed in a 5/8 by 5 in. test tube and heated vigorously over an open flame. As fumes are generated they are poured into a second tube containing 5 ml of water, which is vigorously shaken to mix vapor and water. Repeat the operation until the sample is burned to a cinder. Filter through a fast filter that has been thoroughly washed with water.

Divide the filtrate into two equal parts. To one part add 2 drops of Millon's reagent (freshly prepared by dissolving clean mercury in an equal weight of concentrated nitric acid and diluting with an equal volume of water), shake and heat just to boiling.

A purple to lavender color develops if the sample is entirely paraphenyl phenol resin. Other phenolic resins give a rose pink to red color. Nonphenolic resins give no color.

To the other portion of the filtrate add about 1 mg of 2, 6-dibromoquinone-chlorimide, shake vigorously and add just enough approximately 0.1N-NaOH solution to make alkaline. Now shake once only; let stand, and examine after 5 to 15 minutes.

No color to very light blue is obtained in the presence of 100 per cent paraphenyl phenol resins. Other phenolic resins give a decided blue color in this test. Nonphenolic resins give no blue color. The faded reddish-purple color due to decomposition of the reagent by the alkali should not be mistaken for a positive test.

7.5 Outdoor Exposure - Outdoor exposure is carried out in accordance with Method 143.7, with the addition of an extra treatment of the exposed panels as follows: Applying no more than a moderate pressure, a portion of the film is hand polished with 25-GP-11 liquid automobile polish, using a soft cloth. The polished area is then examined for restoration of color and gloss under 10-power magnification.

8. NOTES

8.1 Intended Uses - Enamel conforming to this specification is intended for use as an interior or exterior protective coating for metal surfaces primed with 1-GP-132 zinc chromate primer. It may also be used for marking insignia and for identification.

8.2 Ordering Data - Purchasers shall specify color required, and packaging, packing and marking if commercial practice is not suitable and if qualification is required.

8.3 Qualification Procedure - Details regarding procedure for qualification of 1-GP-133 enamels may be obtained through:

Controller General
Inspection Services
Department of National Defence
OTTAWA, Ontario.

8.4 Related CGSB Specifications

8.4.1 As to the Coating System:

* 1-GP-121 - Coating; Vinyl, Pretreatment, for Metals

1-GP-132 - Primer; Zinc Chromate

8.4.2 As to End Use:

1-GP-134 - Lacquer; Cellulose Nitrate, Gloss, for Aircraft

8.5 Other Related Specifications

8.5.1 U.S. Specification MIL-E-7729, Enamel; Gloss, for Aircraft Use.

8.6 The publications referred to in 2.1 and 2.2 are obtainable from the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa., U.S.A.

* Magnesium parts used with aluminum and other metals must have a pretreatment with 31-GP-110 conversion coating, or other durable masking agent, to prevent direct contact between the primer and magnesium surfaces, before application of 1-GP-121 wash primer.